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ABSTRACT

This paper presents possible strategies for training educators and teacher trainees in microcomputer technology. Particular emphasis is placed upon possible competencies, instructional sequences, and ways in which microcomputers can realistically be infused in education. In discussing teacher competencies, it is pointed out that it is essential to view the computer as part of a developmental sequence, and that training teachers to use the microcomputer can combine teachers and machines in more efficient and cost-effective ways if properly planned. In order for computer literacy instruction to be effective, it should be accomplished with non-threatening programming experiences, continuous hands-on time, time allotments for problem solving, sharing reactions, and providing opportunities for questions and discussion. An inservice model for individualized instruction in computer literacy for teachers is offered. This model is based upon a training sequence developed according to tested key elements of successful inservice training. Suggestions are made for how training programs might be revamped to incorporate microcomputers in teaching. An inservice contract is appended. (JD)

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Teacher Competencies and Training In the Area of Microcomputer Technology

by

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March, 1984

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Teacher Competencies and Training in the Area of Microcomputer Technology

Introduction-Part One

In the area of microcomputer technology, teacher education is a growing need. It is difficult to envision students who will enter an informational age if their teachers are unprepared. In this paper, possible strategies for training educators and teacher trainees is given. Particular emphasis is placed upon possible competencies, instructional sequences, and ways in which microcomputers can realistically be infused in education.

Teacher Competencies

An assessment is important to determine the interest levels and training needs of public school educators. This should be conducted before the training time-line is developed. A list of needs from this assessment can be helpful in determining district competencies that all teachers will need to achieve as well as which competencies may be limited more appropriately to certain groups.

It is essential when defining teacher competencies with microcomputers to view the computer as part of a developmental sequence. Training teachers to use the microcomputer can combine teachers and machines in more efficient and cost effective ways if properly planned.

A recent article by Dede (1983) indicates that school curricula could be divided into two parts, one called "training" and the other "education." Training incorporates the material with a limited range of right answers. Basic math is an example. Education, however, includes the multiple right answer portion of a curriculum, as with creative writing. Training can be done by machines, while educating is presently best done by people.

As we discuss teacher competencies, it is important to understand that this involves re-training educators to instruct their students in a totally new way. We are asking teachers to delegate certain functions to machines and to focus their time on educational tasks. This is a necessary distinction between training teachers to operate computers and orienting them to using computers as training and managerial tools. Computer orientation is an integral part of such re-training but is far from enough to make optimal use of microcomputer resources.

Studies indicate that there are several areas in which all teachers should be competent if they are to continue quality education in an informational society (Filliman, 1983; Lopez, 1981; Sadowski, 1983). This can be termed "literacy instruction." Six main areas fall within the term:

1. The capabilities of microcomputer systems
2. The operation of a microcomputer system, including the appropriate terminology
3. A survey of educational applications
4. Some appropriate methods for evaluating software
5. The ingredients of a programming language (often BASIC)
6. An appraisal of the societal effects of the microcomputer as an element in the age of information.

In order for the literacy instruction to be effective, it should be accomplished with non-threatening programming experiences, continuous hands-on time, time allotments for problem solving, sharing reactions, and providing opportunities for questions and discussion.

After meeting these fundamentals, teachers need to branch out into their specific need areas. Depending upon the teaching field, a number of other areas might be explored. This might be termed "specialized instruction." A list of these areas can include: writing drill and practice programs, tutorials, games, simulations, problem solving techniques, word processing as a tool for teaching compositional skills, calculations, other programming languages, advanced training in BASIC, record keeping, test development, registrations and scheduling, and using of sound/voice synthesizers.

After teachers have had an opportunity to experience some simple computer operations in a literacy program, it is important for them to look at their own curricula to set the direction for further training. It a district has adequately assessed its curriculum and the several opportunities for computer use, this is a relatively easy task. If not, teachers should take time out to do so to assure a well organized approach and good results.

In order to ensure meaningful curricular change, the specialized instruction ought to meet several criteria:

1. It should be determined by individual teachers based upon curricular need.
2. It should take into account specialized student needs.
3. Adequate classroom instruction time should be given

so both teachers and students can be observed and provided feedback.

4. The experience should be an on-going training program with ample opportunities for monitoring and having discussions with the trainer.

Training Sequence

For many educators the word "inservice" continues to be a dirty word. Many educators have memories of long, boring hours spent listening to someone expound on a subject unrelated to their classroom or professional goals.

A synthesis of several studies on the subject of inservice education provides some tested principles for success. The following nine key elements have been cited in providing inservice that is beneficial (Orlich, 1983):

1. Teachers will benefit from those inservice programs in which they help plan.
2. School-oriented, school-based programs are the most successful.
3. The goals of inservice programming should be clear, specific and well disseminated.
4. Individualized, small group training experiences may produce more positive and lasting results than other programs which feature common activities.
5. If inservice training is to improve system operations, then teachers' personal goals must coincide with those of the district.
6. Inservice training is more likely to be effective if adequate time is provided within the teachers' current work schedule.
7. Incentives should be identified and included for the participants.
8. Involvement of the building principal in the program is critical for sustained success.
9. Evaluation of any aspect of the inservice is an important facet to make necessary adjustments.

In essence the most effective inservice programs are those which allow teachers the involvement in planning and managing their own inservice activities, provide for the pursuit of personal and collective objectives, promote sharing, and enable the application of new information with accompanying feedback. By dividing microcomputer instruction into literacy and specialized sections, these issues can be effectively addressed.

Inservice Model

The preceding principles become increasingly significant when linked with consdierations for dealing with adult learners. Adults bring a great deal of experience, skills, and expectations to a training session. It is important to utilize their background to provide a more appropriate training sequence. For this to occur, inservice programs need to be as individualized as those instructional programs that are suggested for elementary and secondary students (Rottier, 1983).

The inservice model being proposed is an example of individualized inservice. While the first section of microcomputer literacy may be delivered to large groups, the specialized training should not. Since some teachers will already have had literacy instruction, they might serve as trainers for the literacy segment. To adequately meet specialized needs, this model is particularly relevant. It is based upon the idea of offering a number of training possibilities for meeting specific microcomputer needs of teachers. The teachers are then encouraged to select from the options and to devise a plan for their particular area of concern. Plans should be coordinated and encouraged by principals.

The plan is formalized through the use of a contract (see Appendix A for a sample). The contract form is kept on file by the teacher, administrator, and trainer until the inservice is completed.

This inservice model utilizes as many staff members as possible as trainers. Other teachers, administrators, support personnel, and curriculum coordinators can act as trainers to enhance interest general support for the inservice. Community and outside resource people can act in the training capacity. The important consideration is that the chosen trainer be adept in the required skill sought and is an effective communicator.

The model presented meets the criteria of effective inservice training because it allows teachers to assist in planning and managing their professional development. It is school based. The goals and objectives are clear for participants. It gives teachers and administrators an opportunity to discuss and participate in meeting district goals. If properly planned, it could take place during the teachers' regular work day. It has both formative and summative evaluative components so that teacher progress and the efficiency of training

evaluated. Some possible strategies that can be chosen by teachers as training options are: course enrollment, development and completion of a reading list, a teacher discussion/activity group, interviewing resource people, selecting and attending sessions with a speaker or consultant (preferably school based), updating a curriculum plan, videotaping classroom performance, and inter/intra-school visitations.

Teachers can generate any number of ways to work on a given topic. As long as it is acceptable to teacher, administrator, and trainer, and feasible within the restraints of a school setting, it should be utilized. Teachers need to feel free to explore and to create their training within this new methodology if smoothly adopted change in microcomputers is to result. The model is particularly suited to microcomputer inservice for many reasons. Primarily, it acknowledges that teachers have had varying degrees of experience with computers. It provides the opportunity for group literacy training for those who need it, but also provides teachers with the opportunity formulate individualized training for specialized computer skills. Teachers can work with teachers to eliminate fears and encourage friendly vehicles for change. Finally, it acknowledges that we are a changing society by providing methods to assist and effect training in the "information age" for new and better education.

Part Two

This part of the paper builds upon the model and ideas presented in Part One. It will focus on teacher training programs by citing some elements which influence preservice teacher training in microcomputer technology. This will culminate in some suggestions for how training programs might be revamped to incorporate microcomputers in teaching.

Influencing Teacher Training

One significant element influencing colleges of education today is the State Department of Education. This involvement waxes hot and wanes seldom in many states. Relevant here is the illustration of how well-meaning groups influence what can/cannot be changed in teacher education and the necessity for well formulated strategies for change.

Typically, state level change takes place after seeking local inputs. The route often begins with a

task force of a sub-committee. These folks report to a standing committee who in turn report to the State Board of Education and the Legislature. Sometimes changes can get stalled. The evolution of microcomputer technology makes this a critical issue, as the time lag that adds process stability to government and assures local input embraces obsolescence. For example, a teacher certification program in computer science was recently returned to the task force in New Mexico after a year of study. A central feature of the proposal was the inclusion of two programming language courses. With the advent of voice synthesizers, these requisites may be superfluous if/when the certification standard goes into effect five years hence at best.

A second element influencing teacher training that needs to reckoned with is the adherence to minimum state standards. To avoid "padding programs" with extra courses, and to maintain homogeneity among state institutions, this logical mandate can stall changes such as the adoption of a methods course in how to teach with computers. Many advocate groups abound to call for inclusion in teacher preparation competencies: integrating special education regular education, skill-building in nonsexist instruction, cultural awareness development, expertise in unbiased evaluation of students, recognizing child abuse and neglect, teaching reading/writing through subject matter, drug education, etc. The important perspective to bear in mind is that regardless of how beneficial or how self-serving the priorities are, changes come through well defined channels with expectations at each step in the process. State departments are but one example.

A third influence which impacts teacher training programs is steeped in the halls of tradition. Historically, the computer was sired from somewhere in the depths of mathmatics. Turning over the child of cipher to education can be seen as a breech in territories and done grudgingly. Requiring a math certification to teach computer education, for example, is a popular stand espoused to protect the integrity of computer science. In an age where the number of students in a program spells life-giving money, this stand is not unrealistic between departments.

These key elements influence teacher preparatory programs and illustrate how strategies for change which include microcomputers must be carefully and realistically planned within an "arena" that is well defined. This is not to suggest that there is such rigidity that change is beyond expectations. Lasting change, however, needs to be planned in ways that yield acceptance and foster feelings of ownership.

Literacy Program Revisited

A critical step in the progression of ideas leading to the what-and-how of computers in education is based upon the concept of a literacy program as presented earlier. One point draws upon a lesson learned in special education as it evolved through a bandwagon era. Avoid the pitfall of building a mystique. In its hayday special educators had private, federal and state money, fancy lingo with acronyms and polysyllabic buzzwords, high-tech equipment, and folks across the country cranking out instructional materials of every description.

Does this have a familiar ring with respect to computers today? The pitfall of all this stems from the fact that it is so alien and seemingly incomprehensible, many educators hide from it. The result of building a fraternity of special educators led to nurturing of mystique that special student education was too different for the regular educator. This author cautions those who would create a similar fraternity among computer users. Just as special education has become infused with regular education classes with great growing pains, so too can a mystique create barriers of infusion among educators who resist computer technology and its benefits as we try to move into the classrooms of all students.

An essential part of the literacy program presented earlier is the need for universal involvement on the part of a faculty. This begins with assessing the curriculum and determining the priorities for computer usage. This applies as well for college professors, for we are also asking them to be re-trained in a totally new way just as the teacher or preservice trainee. As mentioned, ownership in developing and implementing change is needed among any faculty to avoid attitude barriers and to assure the changes are realistic within that "well defined arena."

What seems most logical for making curricular changes given the structure of state standards, the territoriality of university components, and the diversity of faculty opinion might well be a construct developed in special education called "cross-categorical programming." By working within the prescribed number of courses in a teacher training program, the appropriate faculty could choose a program of interest and work to identify a list of curricular topics most appropriate for specific teacher training sequences. Teaching methods or relevant aspects of psychology are examples, as is computer technology. Whether these ingredients parallel a state mandated accountability test for trainees or prescribe

competencies identified by feedback from public schools, faculty could use course syllabi, texts, and hand-outs to streamline, delete, or add new training topics across courses. No single academic subject would necessarily be the basis for a course, such as Developmental Psychology. Rather, a progression of topical sequences, ie. the "cross-categorical" approach could be used to include related concepts deemed important. Concepts of drug abuse, child neglect and abuse might be combined in a new course replacing Educational Psychology. Topics of nonsexist education, instructing special students in regular classes, and microcomputer applications might be good topics in a methods class.

In this way a university faculty could work together to preserve those ingredients deemed important while simultaneously maintaining ownership in the program. Coordinating the efforts could take place by a dean or an assistant dean, as changes in the administration of teacher education programs might occur.

Several secondary benefits might also occur with the prioritizing of topics and reorganizing into course sequences. More field experiences, team teaching in methodology with subject matter (eg. computer usage in skill-building along the language arts continuum), or workshops for topical issues that are in vogue might be identified as useful additions. In this way an on-going process of updating the teacher training sequences can occur that goes beyond the course after course approach.

Orlich Revisited

Earlier a training sequence was presented as detailed by Orlich (1983). Within the context of colleges of education, Orlich's nine elements can be reworked for a how-to recipe with faculty in teacher training programs. These reworked steps include:

1.,2. Organize the faculty who represent productive contributors over a wide array of subjects to help plan the identification and prioritizing of topical ingredients in the training sequences.

3. Establish the first meeting(s) as information sharing sessions to clearly identify the goals and scope of the curricular changes. For example, specify to what extent microcomputer technology should be incorporated into teacher training as technique for instructional assistance as well as a topical entity for computer science education.

4.,5. Coordinate the various activities by dividing the faculty into small groups with common interests and overseeing products by a dean. This allows the

faculty to utilize personal goals in their training programs and wins ownership for the changes.

6. Legitimate effort should be encouraged by allowing reduced academic loads, secretarial and xeroxing supports, and sufficient time to allow for the evolution of putting group-derived ideas into workable end results.

7. Incentives are a valuable component for producing a quality result. Merit pay if in place, trips to related curriculum modification conferences, or local/regional journal exposure are examples.

8. The person coordinating the faculty needs to keep superiors informed and serve as liaison so that administrative support is preserved. Little meaningful change can occur without support from above.

9. The most productive people and new faculty should be encouraged to help monitor and revise the curriculum for an on-going process within the university.

While the above set of suggestions provide a recipe for how faculty might go about incorporating microcomputer technology (or any curricular change) into the teacher training sequence, little was mentioned about what might be included. Three ideas are offered to train teachers for the world of information in education. While not exhaustive, these ideas focus on components of typical teacher-training sequences and provide heuristic thought:

a. General Education courses make up one of three groups of coursework to get a teaching degree. Usually about 40 percent of the degree coursework (about 50 hours), the general education requisites tend to cover several areas of academics: composition, math, social science, science, etc. Few experiences provide better skill development with microcomputers than demonstrations and usage incorporated in class activities for a learner. Word processing in a Composition class, programming in Math, data management systems in Science, and softward applications among any subject area can enrich the general education classes and provide "modeling" exposures to students who will be expected to use similar techniques as an educator.

b. The second main group of courses is the subject-area major and minor. These courses also occupy about 40 percent of a degree program and are ripe for streamlining with computer software and usage projects. Whether graphics in Art, synthesizers in Music, or trigonometric programs for Math, either

elemental or advanced constructs can be enhanced by a "sub-curriculum" using computers in a course. The availability of software makes these options more viable on a monthly basis.

c. The professional education or teacher-training sequence is the third main course group for the teacher trainee. The pay-off for students in this area is usually field experiences and methods courses which put the skill of instruction into operational perspective (Worth, 1984). Methods courses could be streamlined to include:
-selecting appropriate software (before hardware)
-increasing classroom management techniques with computer assistance for all (or problem) learners
-using spread sheets for accounting of students' progress and to prescribe instructional options to accomodate varying student learning rates
-teaching children how to use computers and care for the equipment
-how to integrate subject matter among classes to enrich understanding. For example, combining map skills with vocabulary or math on the computer can make subjects more enjoyable and meaningful.

Conclusion

Whether expanding training for students, teacher trainees, educators, or college faculty, change can be hampered by expectations unmet, good intentions, and a history of barrier building. Limitations for microcomputer use can come from devotees who might alienate folks if they build a mystique of jargon and attitude. Sound strategies for change can occur by making use of the available, productive people when properly planned. Support from administrators is essential. Incorporating the needs and talents of the people impacted by the changes that proliferate microcomputer usage is also vital. Limitations of experience and innovation to assist the profession of education throughout the hierarchy are only a matter of planning, imagination, and one's pocketbook.

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Appendix A

Inservice Contract

Name: School:

Date initiated: Date completed:

Trainer: Administrator:

Goals:

Strategies:

Materials and Resources:

Monitoring and Feedback Techniques:

Assessment of Participant(s):

Evaluation of Contract:

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